

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Restriction/election

Applicants affirm their election of claim group I, claims 1-10. Applicants have cancelled non-elected claims 11-19 and reserve the right to pursue these claims in one or more divisional patent applications.

Rejection under 35 USC § 112, second paragraph

Claims 6 and 7 stand rejected under 35 USC 112, second paragraph, for being indefinite. Applicants have amended claims 6, 7 and 10 to substitute the term "volume" for the term "chamber." Support is found in the specification at paragraph 0028 and in the drawings at Figs. 1, 2 and 4 (chamber section 104). No new matter has been added. Accordingly, applicants believe that the rejection under 35 USC 112, second paragraph, is now obviated.

Rejection under 35 USC § 102

Claims 1 and 6-7 stand rejected under 35 USC § 102 as being anticipated by Ebe et al. U.S. Patent No. 5,728,425. Applicants respectfully traverse this rejection.

Applicants' invention as defined in claim 1 is directed to a novel and unobvious method of depositing material on a substrate by providing a reactor with a reaction chamber having a first volume, contacting a surface of a substrate in the reaction chamber with a first precursor at the first chamber volume to react with and deposit a first layer on the substrate, and enlarging the reaction chamber to a second, larger

volume and removing undeposited first precursor and any excess reaction product to end reaction of the first precursor with the substrate. Applicant has amended claim 1 to recite that the first precursor is introduced into the reaction chamber at the first chamber volume. Support is found in the specification at paragraph 0030, lines 1-10, and in the drawings at Fig. 3, step 24 ("move pedestal to top position and flow precursor one"). No new matter has been added.

The Ebe et al. patent discloses a chemical vapor deposition (CVD) process used in a CVD reactor chamber that has a piston that can change the volume of the chamber. In operation, the piston is pulled down to the bottom of the chamber and the reactant gases are introduced while the chamber has the largest volume. Then, the chamber valves are closed and the piston is pushed upward to pressurize the chamber, at which time the pressure is increased sufficiently for the reactants to initiate crystal growth on the substrate in the chamber. After crystal growth ceases, the outlet valve is opened to exhaust residual gas, and the piston is again pulled down.

The Ebe et al. process is considerably different from, and does not anticipate applicants' method as amended in claim 1. Applicants' claim 1 requires that the first precursor be introduced into the reaction chamber at the first (smaller) chamber volume. This is the opposite of the Ebe et al. method, wherein the reactant gases are introduced into the chamber at the larger volume. As such, Ebe et al. does not anticipate claim 1 as amended. Since Ebe et al. uses the compression provided by the piston to achieve the pressure needed for the initiation of crystal growth, it would also not be obvious to modify the Ebe et al. method to that claimed by applicants' since the desired CVD reaction could not then be achieved.

Accordingly, applicants submit that independent claim 1 and dependent claims 6 and 7 are patentable over the Ebe et al. patent.

Rejection under 35 USC § 103

Claims 2-4, 8 and 10 stand rejected under 35 USC § 103 as being obvious from Ebe et al. in view of Luo et al. U.S. Patent Publication No. 2003/0059535. Applicants respectfully traverse this rejection.

Applicants' claims 2 and 8 introduce to the subject matter described above in connection with claim 1 the further steps of reducing the reaction chamber to the first chamber volume, contacting the first layer in the reaction chamber with the second precursor at the first chamber volume to react with and deposit a second layer on the first layer, thereby forming a film, and enlarging the reaction chamber to the second volume and removing undeposited second precursor and any excess reaction product to end reaction of the second precursor. Applicants have amended claims 2 and 8 to recite that the second precursor is introduced into the reaction chamber at the first chamber volume. (Claim 8 has also been amended in the manner of claim 1 to recite the first precursor is introduced into the reaction chamber at the first chamber volume.) Support for these amendments is found in the specification at paragraph 0030, lines 15-23, and in the drawings at Fig. 3, step 28 ("move pedestal to top position and flow precursor two"). No new matter has been added.

The Ebe et al. patent does not disclose or suggest introducing the second precursor into the reaction chamber at the first (smaller) chamber volume since it relies on the compression of the gaseous reactants from the larger chamber volume to achieve crystal growth conditions. The cited Luo et al. patent does not disclose any deposition of films by changing chamber volume, and therefore does not make up for

the deficiencies of Ebe et al. Therefore, applicants submit that claims 82 and 8 as amended are not obvious to one of ordinary skill in the art from the combined teachings of Ebe et al. and Luo et al.

Applicants have also added new claims 20-22, which recite that one or both precursors are diffused through a perforated plate above the pedestal in the reactor chamber. Neither of the references applied against the claims discloses or suggests such a step.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,



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